UCRSF
21-4
12/14/06

Kevin
Rochlin/R10/USEPA/US
12/14/2006 02:17 PM

To gary.passmore@colvilletribes.com, jrol461@ecy.wa.gov, daniel_audet@nps.gov, connolly@spokanetribe.com, Bruce Duncan/R10/USEPA/US@EPA, Monica
cc Bruce Duncan/R10/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA
bcc

Subject RAO Comments

Attached is the revised ROA letter. I have incorporated comments received on my letter as much as possible.

There is one important proposed change that we are not going to make. EPA is not going to require Teck to change the PRAO language as it is consistent with language that EPA uses nationally. I have included a compiled list of the RAOs for all of the Tier 1 (large) sediment sites. Nationally, EPA has been using the language "Reduce Risks From..." for all of its sediment sites. In addition, our CERCLA policy expert Judi Schwarz has accepted the the language, and thinks that it may actually be stronger than the alternatives proposed. Please remember in mind that our expectation is that these will be revised as the project progresses.

Kevin

RAO deliverable comments.doc (1) National sediment site RAO.xls (2)

From:

Kevin Rochlin, Project Manager
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United States Environmental Protection Agency
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(1)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

Reply to
Attn of: ECL-112

Reply to
Attn of: ECL-112

Marko Adzic
Manager Environmental Engineering
Teck Cominco American, Inc.
501 North Riverpoint Boulevard
Spokane, WA 99202

Re: Technical Memorandum on Risk Management Based Action Objectives (RMAO)

Dear Mr. Adzic:

Attached to this letter are the comments on the referenced Memorandum. Because the RMAOs were prepared prior to the completion and approval of the conceptual site model (CSM), there are a number of potential pathways that may need to be addressed as this project progresses. We have noted some of these in our comments. We are requesting that some revisions be made to the Memorandum. However, because there is not an approved CSM, we are not requiring that the list of RMAOs be expanded at this time.

As required on page 2 of the Scope of Work, we request that Teck Cominco prepare a brief response to the comments for review prior to revising the document. I would be glad to discuss potential response formats with you.

If you have any questions, please call me at 206 553-2106.

Sincerely,

Kevin Rochlin
Project Manager

Attachment

cc: by email only
EPA Technical Team
Participating Parties
Cara Steiner-Riley
Elizabeth McKenna

(2)

Remedial Action Objectives for Tier 1 Sediment Sites

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
1	GE - HOUSATONIC RIVER	0	Silver Lake	Information not available.		PCBs	Entire lake bottom	RPM		
			Upper 1/2 Mile Reach	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion; and Prevent the downstream migration of contaminated sediments	8/1999 Removal Action Work Plan	PCBs	1 ppm	RPM	1 ppm	RPM
		4	1 1/2 Mile Reach Removal Action	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion; and Prevent the downstream migration of contaminated sediments	11/21/2000 Action Memo	PCBs	1 ppm	RPM	1 ppm	RPM
1	LORING AIR FORCE BASE	13	East Branch of Greenlaw Brook	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion; and Minimize migration of sediment	6/16/1997 ROD	PCB-1260			1 ppm	RPM
1	NEW BEDFORD	1	Acushnet River North of Wood Street	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	9/25/1998 ROD	PCBs			10 ppm	RPM
			Lower Harbor	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/25/1998 ROD	PCBs			50 ppm	9/25/1998 ROD
			Upper Harbor	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	9/25/1998 ROD	PCBs			10 ppm	9/25/1998 ROD
		2	Harbor Hot Spots	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	4/6/1990 ROD	PCBs	4000 ppm	4/6/1990 ROD	4000 ppm	4/6/1990 ROD
1	NEWPORT NAVAL EDUCATION & TRAINING CENTER	4	Narragansett Bay	Eliminate human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion;	RPM	ANTHRACENE	0.51 ppm	RPM	0.51 ppm	RPM
						FLUORENE	0.20 ppm	RPM	0.20 ppm	RPM
						PCBs	3.6 ppm	RPM	3.6 ppm	RPM
						PYRENE	3 ppm	3/1/2000 ROD	3 ppm	3/1/2000 ROD
1	NYANZA CHEMICAL WASTE DUMP	3	Wetlands & Drainage Ways	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	3/30/1993 ROD	MERCURY			1 ppm	RPM

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
1	PINE STREET CANAL	1	Turning Basin, Pine Street Canal and Wetlands	Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity;	9/29/1998 ROD	PAHs				
1	SULLIVAN'S LEDGE	1	Unnamed Stream	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	6/29/1989 ROD	PCBs	20 mg/gC	RPM	20 mg/gC	6/29/1989 ROD
		2	Middle Marsh Wetland	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	RPM	PCBs	15 ppm	RPM	15 ppm	RPM
2	BATAVIA LANDFILL	1	Galloway Swamp	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce risk to wildlife due to fish/shellfish ingestion	6/6/1995 ROD	BARIUM, CHRYSENE, LEAD				
2	BURNT FLY BOG	2	Downstream Area	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/29/1988 ROD	LEAD	250 ppm	9/29/1988 ROD	250 ppm	9/29/1988 ROD
						PCBs	5 ppm	9/29/1988 ROD	5 ppm	9/29/1988 ROD
		3	Northerly Wetlands	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	RPM	LEAD	400 ppm	9/30/1998 ROD	400 ppm	9/30/1998 ROD
						PCBs	0.49 ppm	9/30/1998 ROD	0.49 ppm	9/30/1998 ROD
			Tar Patch Area	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	RPM	LEAD	400 ppm	9/30/1998 ROD	400 ppm	9/30/1998 ROD
						PCBs	0.49 ppm	RPM	0.49 ppm	RPM
			Westerly Wetlands	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/30/1998 ROD	LEAD	400 ppm	9/30/1998 ROD	400 ppm	9/30/1998 ROD
						PCBs	5 ppm	RPM		
2	CHEMICAL LEAMAN TANK LINES, INC.	3	Swale Area, Ponded Area, and Adjacent Wetlands	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion; and Prevent offsite migration; prevent and repair wetland degradation	10/5/1993 ROD	CADMIUM, CHROMIUM, COPPER, LEAD, MERCURY				
2	GENERAL MOTORS (CENTRAL FOUNDRY DIVISION)	1	Raquette River	Reduce human health risk from ingestion of fish/shellfish	12/17/1990	PCBs	1 ppm	RPM	1 ppm	RPM
			St. Lawrence River	Reduce human health risk from ingestion of fish/shellfish	12/17/1990 ROD	PCBs	1 ppm	12/17/1990 ROD	1 ppm	12/17/1990 ROD
			Turtle Creek/Turtle Cove	Reduce human health risk from ingestion of fish/shellfish	12/17/1990 ROD	PCBs	0.1 ppm	12/17/1990 ROD	0.1 ppm	12/17/1990 ROD
2	HOOKER (102ND STREET)	1	Niagara River Embayment	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Eliminate human health risk from ingestion of fish/shellfish	9/26/1990 ROD	HEXACHLOROBENZENE				

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed Cleanup Level Reference
2	HUDSON RIVER PCBS	2	Upper Hudson River (Section 1)	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion; Reduce PCB levels in sediment to reduce surface water concentrations below ARARs; Reduce bioavailable mass of PCBs in sediment and minimize long-tern downstream PCB transport.	2/1/2002 ROD	PCBs	3 g/m2	2/1/2002 ROD	1 ppm	2/1/2002 ROD
			Upper Hudson River (Section 2)	Reduce human health risk from ingestion of fish/shellfish;Reduce risk to wildlife due to fish/shellfish ingestion; Reduce PCB levels in sediment to reduce surface water concentrations below ARARs; Reduce bioavailable mass of PCBs in sediment and minimize long-tern downstream PCB transport.	2/1/2002 ROD	PCBs	10 g/m2	2/1/2002 ROD	1 ppm	2/1/2002 ROD
			Upper Hudson River (Section 3)	Reduce human health risk from ingestion of fish/shellfish;Reduce risk to wildlife due to fish/shellfish ingestion; Reduce PCB levels in sediment to reduce surface water concentrations below ARARs; Reduce bioavailable mass of PCBs in sediment and minimize long-tern downstream PCB transport.	2/1/2002 ROD	PCBs			1 ppm	2/1/2002 ROD
2	LIPARI LANDFILL	3	Stream and Lake Sediments	Eliminate human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity	7/11/1988 ROD	BIS(2-CHLOROETHYL) ETHER	0.001 ppm	RPM		
2	LOVE CANAL	2	Black and Bergholtz Creeks	Reduce human health risk from dermal contact/incident al ingestion of surface water/sediment;Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	RPM	DIOXINS (CHLORINATED DIBENZODIOXINS)	0.001 ppm	RPM	0.001 ppm	RPM
2	MARATHON BATTERY CORP.	1	East Foundry Cove Marsh	Eliminate human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion	9/30/1986 ROD	CADMIUM	100 ppm	9/30/1986 ROD	100 ppm	9/30/1986 ROD
		2	East and West Foundry Cove/Hudson River	Eliminate human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion	RPM	CADMIUM	10 ppm	9/29/1989 ROD		
2	ONONDAGA LAKE	2	Onondaga Lake	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion	7/1/2005 ROD	MERCURY			0.8 mg/kg	7/1/2005 ROD
		5	West Flume	Reduce risk to wildlife due to fish/shellfish ingestion;	9/29/2000 ROD	MERCURY	0.2 ppm	9/29/2000 ROD	0.2 ppm	9/29/2000 ROD
2	REYNOLDS METALS CO	1	St. Lawrence & Raquett Rivers	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/27/1993 ROD	PAHs	10 ppm	RPM	10 ppm	RPM
						PCBs			1 ppm	9/27/1993 ROD
						TDBFs			0.001 ppm	9/27/1993 ROD
2	RICHARDSON HILL ROAD LANDFILL/POND	1	South Pond	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/30/1997 ROD	PCBs	1 ppm	9/30/1997 ROD	1 ppm	9/30/1997 ROD

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
2	ROEBLING STEEL CO.	5	Delaware River and Crafts Creek	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	9/30/2003 ROD	4,4-DDD			2.2 ppb	9/30/2003 ROD
						4,4-DDE			2.2 ppb	9/30/2003 ROD
						ARSENIC			6 ppm	9/30/2003 ROD
						CHROMIUM			26 ppm	9/30/2003 ROD
						LEAD			31 ppm	9/30/2003 ROD
						MERCURY			0.15 ppm	9/30/2003 ROD
2	VINELAND CHEMICAL CO., INC.	3	Blackwater Branch Floodplain & Maurice River	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Eliminate human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion	9/28/1989 ROD	ARSENIC			20 ppm	7/27/1999 ROD
		4	Union Lake Sediments	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/28/1989 ROD	ARSENIC	20 ppm	9/28/1989 ROD	20 ppm	9/28/1989 ROD
2	YORK OIL CO.	2	Western Wetland	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/29/1998 ROD	LEAD	31 ppm	2/2003 Long-Term Monitoring Report	31 ppm	2/2003 Long-Term Monitoring Report
						PCBs	1 ppm	9/29/1998 ROD	1 ppm	9/29/1998 ROD
3	DIXIE CAVERNS COUNTY LANDFILL	1	Streams B and E	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Eliminate human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity	RPM	LEAD	500 ppm	RPM		

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
3	E.I. DU PONT DE NEMOURS & CO., INC. (NEWPORT PIGMENT PLANT LANDFILL)	3	North Wetlands	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	8/26/1993 ROD	CADMIUM	9.6 ppm	9/30/1996 Post Decision Document		
						LEAD	660 ppm	9/30/1996 Post Decision Document		
						ZINC	1600 ppm	9/30/1996 Post Decision Document		
		5	South Wetlands	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	8/26/1993 ROD	CADMIUM	35 ppm	RPM		
						LEAD	670 ppm	RPM		
						ZINC	2000 ppm	RPM		
		7	Christina River	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	RPM	CADMIUM	20 ppm	8/5/1996 Memo	6 ppm	RPM
						LEAD	700 ppm	8/5/1996 Memo	120 ppm	RPM
						ZINC	3000 ppm	8/5/1996 Memo	1500 ppm	RPM
3	KOPPERS CO., INC. (NEWPORT PLANT)	1	Wetlands, Ponds, Hershey Run	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/30/2005 ROD	PAH	150 ppm	RPM	150 ppm	RPM
3	METAL BANKS	1	River/Mudflat Sediments	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	12/31/1997 ROD	PCBs	1 ppm	12/31/1997 ROD	1 ppm	12/31/1997 ROD
4	KOPPERS CO INC. (CHARLESTON PLANT)	1	Ashley River	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	4/29/1998 ROD	PAHs				
			Barge Canal	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	4/29/1998 ROD	PAHs				
			North Marsh Sediments	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	4/29/1998 ROD	PAHs				
			South Marsh Sediments	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	4/29/1998 ROD	ARSENIC, LEAD, PAHs				

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
4	SANGAMO WESTON, INC./TWELVE-MILE CREEK/LAKE HARTWELL PCB CONTAMINATION	2	Twelve Mile Creek	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish	6/28/1994 ROD	PCBs			1 ppm	6/28/1994 ROD
4	STAUFFER CHEMICAL CO. (COLD CREEK PLANT)	3	Cold Creek Swamp	Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion	9/17/1993 ROD	MERCURY				
4	TERRY CREEK DREDGE SPOILS AREAS/HERCULES OUTFALLS	1	Terry Creek	Information not available.		TOXAPHENE				
4	TRIANA/TENNESSEE RIVER	0	Huntsville Spring Branch - Indian Creek	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	RPM	DDT				
5	FORD MOTOR CO	0	River Raisin	Information not available.		PCBs	10 ppm	RPM	10 ppm	RPM
5	FOX RIVER NRDA/PCB RELEASES	1	Little Lake Butte des Marts	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion; Reduce downstream PCB transport; Achieve SWQ criteria	12/20/2002 ROD	PCBs	1 ppm	12/20/2002 ROD	SWAC of 0.25 ppm from 0-10cm of depth	12/20/2002 ROD
		2	Appleton to Little Rapids	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion; Reduce downstream PCB transport; Achieve SWQ criteria	12/20/2002 ROD	PCBs				
		3	Little Rapids to De Pere	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion; Reduce downstream PCB transport; Achieve SWQ criteria	6/30/2003 ROD	PCBs	1 ppm	6/30/2003 ROD	1 ppm	6/30/2003 ROD
		4	De Pere to Green Bay	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion; Reduce downstream PCB transport; Achieve SWQ criteria	6/30/2003 ROD	PCBs				
		5	Green Bay	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion; Reduce downstream PCB transport; Achieve SWQ criteria	6/30/2003 ROD	PCBs				
5	LITTLE MISSISSINEWA RIVER	0	Little Mississinewa River	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	7/20/2004 ROD	PCBs	4 ppm in top 12 inches; 5 ppm below	7/20/2004 ROD	1 ppm in top 12 inches; 5 ppm below	7/20/2004 ROD

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
5	MANISTIQUE RIVER/HARBOR AREA OF CONCERN	0	River/Harbor AOC	Eliminate human health risk from ingestion of fish/shellfish; Eliminate risk to wildlife due to fish/shellfish ingestion	11/2002 Final Comprehensive Post Removal Summary Report	PCBs	10 ppm	Action Memo		
5	OUTBOARD MARINE CORP.	1	Crescent Ditch/North Ditch	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	RPM	PCBs	10000 ppm	3/31/1989 ROD		
		1	Upper Harbor/Slip No. 3	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion	5/15/1984 ROD	PCBs	50 ppm	2002 5-Year Review	50 ppm	2002 5-Year Review
5	SANGAMO ELECTRIC DUMP/CRAB ORCHARD	2	Crab Orchard Lake Area	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	RPM	CADMIUM			10 ppm	RPM
						LEAD			450 ppm	RPM
						PCBs			0.5 ppm	RPM
5	SHEBOYGAN HARBOR & RIVER	1	Inner Harbor	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion	5/12/2000 ROD	PCBs	Soft sediments	5/12/2000 ROD	0.5 ppm	5/12/2000 ROD
			Middle and Lower River	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion	5/12/2000 ROD	PCBs	26 ppm	5/12/2000 ROD	0.5 ppm	5/12/2000 ROD
			Upper River	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion	5/12/2000 ROD	PCBs			0.5 ppm	5/12/2000 ROD
5	VELSICOL CHEMICAL CORP. (MICHIGAN)	2	Pine River/St. Louis Impoundment	Reduce human health risk from ingestion of fish/shellfish; Reduce risk to wildlife due to fish/shellfish ingestion	6/9/1998 Action Memo	DDT	5 ppm	6/9/1998 Action Memo	5 ppm	6/9/1998 Action Memo
5	YEOMAN CREEK LANDFILL	1	Yeoman Creek and Wetlands	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	9/30/1996 ROD	LEAD	180 ppm	9/30/1996 ROD		
						PAHs	26 ppm	9/30/1996 ROD		
						PCB-1248	3.4 ppm	9/30/1996 ROD		
						ZINC	320 ppm	9/30/1996 ROD		

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
6	ALCOA (POINT COMFORT)/LAVACA BAY	1	Chlor-Alkali Process Area	Information not available.		MERCURY	Mass removal	RPM		
			Natural Recovery Areas	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	Action Memo	MERCURY			0.25 ppm Marsh/0.5 ppm Open Water	Action Memo
			North of Dredge Island	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	Action Memo	MERCURY			0.5 ppm	Action Memo
			Witco Channel	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; and Eliminate/reduce mercury loading from on-going unpermitted sources to Lavaca Bay	Action Memo	MERCURY	Mass removal	RPM		
6	BAILEY WASTE DISPOSAL	1	Marsh Area	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment;	6/28/1988 ROD	CHROMIUM, ETHYLBENZENE, LEAD, PAHs, ZINC	Visual inspection	4/1998 Parsons Report		
6	BAYOU BONFOUCA	2	Bayou Sediments	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	3/31/1987 ROD	PAHs	1300 ppm	3/31/1987 ROD	1300 ppm	3/31/1987 ROD
8	EAGLE MINE	1	Maliot Park Wetland	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Restore wetlands	3/29/1993 ROD Amendment	LEAD	1000 ppm	3/29/1993 ROD Amendment	1000 ppm	3/29/1993 ROD Amendment
8	MILLTOWN RESERVOIR SEDIMENTS	1	Reservoir	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	12/15/2004 ROD	ARSENIC, COPPER				
8	MONTICELLO MILL TAILINGS (USDOE)	1	Montezuma Creek	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment;	RPM	RADIUM 226	5 pCi/g	RPM	5 pCi/g	RPM
8	ROCKY MOUNTAIN ARSENAL (USARMY)	3	Lake Sediments Remediation Project	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	6/11/1996 ROD	ALDRIN	3.8 ppm	6/11/1996 ROD	3.8 ppm	6/11/1996 ROD

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed Cleanup Level Reference
8	SHARON STEEL CORP. (MIDVALE TAILINGS)	1	Marshy Area	Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity;	12/9/1993 ROD	ARSENIC	70 ppm	12/9/1993 ROD	70 ppm	12/9/1993 ROD
						LEAD	500 ppm	12/9/1993 ROD	500 ppm	12/9/1993 ROD
8	SILVER BOW CREEK/BUTTE AREA	1	Silver Bow Creek	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	11/29/1995 ROD	ARSENIC			200 ppm	11/29/1995 ROD
						CADMIUM			20 ppm	11/29/1995 ROD
						COPPER			1000 ppm	11/29/1995 ROD
						LEAD			1000 ppm	11/29/1995 ROD
						MERCURY			10 ppm	11/29/1995 ROD
						ZINC			1000 ppm	11/29/1995 ROD
9	IRON MOUNTAIN MINE	5	Spring Creek Arm	Minimize downstream migration of sediments to meet water quality standards downstream in Sacramento River	9/30/2004 ROD	ARSENIC, COPPER, IRON, ZINC				
9	MCCORMICK & BAXTER CREOSOTING CO.	1	Old Mormon Slough	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion; Prevent migration of contaminants from sediments to ground water	3/31/1999 ROD	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)	0.021 ppb	3/31/1999 ROD	0.021 ppb	3/31/1999 ROD
						PAHs	330 ppm	3/31/1999 ROD	330 ppm	3/31/1999 ROD
9	UNITED HECKATHORN CO.	1	Lauritzen Channel and Parr Canal	Reduce human health risk from ingestion of fish/shellfish; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Eliminate risk to wildlife due to fish/shellfish ingestion	10/26/1994 ROD	DDT	0.59 ppm	10/26/1994 ROD	0.59 ppm	10/26/1994 ROD

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
10	COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	6	ASARCO Sediments	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	7/2000 ROD	ARSENIC			93 ppm	7/2000 ROD
						COPPER			390 ppm	7/2000 ROD
						LEAD			450 ppm	7/2000 ROD
						ZINC			410 ppm	7/2000 ROD
		10	St. Paul Waterway	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	RPM	4-METHYLPHENOL	1300 ppb	9/30/1989 ROD	670 ppb	9/30/1989 ROD
		11	Sitcum Waterway	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/30/2004 ESD	ARSENIC	160 ppm	9/30/1989 ROD	57 ppm	9/30/1989 ROD
						COPPER	1100 ppm	9/30/1989 ROD	390 ppm	9/30/1989 ROD
		12	Hylebos Waterway	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/30/2004 ESD	ARSENIC	97 ppm	9/30/1989 ROD	57 ppm	9/30/1989 ROD
						HEXACHLOROBENZENE	100 ppb	9/30/1989 ROD	22 ppb	9/30/1989 ROD
						HPAHs	32 ppm	9/30/1989 ROD	17 ppm	9/30/1989 ROD
						PCBs	0.45 ppm	RPM	0.45 ppm	RPM
		13	Thea-Foss and Wheeler-Osgood Waterways	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/30/2004 ESD	CADMIUM	6.6 ppm	9/30/1989 ROD	5.1 ppm	9/30/1989 ROD
						HPAHs	22 ppm	9/30/1989 ROD	17 ppm	9/30/1989 ROD
						LEAD	580 ppm	9/30/1989 ROD	450 ppm	9/30/1989 ROD
						MERCURY	0.77 ppm	9/30/1989 ROD	0.59 ppm	9/30/1989 ROD
						ZINC	490 ppm	9/30/1989 ROD	0.59 ppm	9/30/1989 ROD
		26	Middle Waterway	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity ;Reduce risk to wildlife due to fish/shellfish ingestion	9/30/2004 ESD	COPPER	470 ppm	9/30/1989 ROD	390 ppm	9/30/1989 ROD
						MERCURY	0.71 ppm	9/30/1989 ROD	0.59 ppm	9/30/1989 ROD

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
10	HARBOR ISLAND (LEAD)	7	Lockheed Sediments	Reduce human health risk from ingestion of fish/shellfish;	11/27/1996 ROD	ARSENIC	57 ppm	RPM	57 ppm	RPM
						COPPER	390 ppm	RPM	390 ppm	RPM
						HPAHs	960 ppm	RPM	960 ppm	RPM
						LEAD	450 ppm	RPM	450 ppm	11/27/1996 ROD
						LPAHs	370 ppm	RPM	370 ppm	11/27/1996 ROD
						MERCURY	0.41 ppm	RPM	0.41 ppm	11/27/1996 ROD
						PCBs	12 ppm	RPM	12 ppm	11/27/1996 ROD
						ZINC	410 ppm	RPM	410 ppm	RPM
		9	Todd Shipyard Sediments	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	RPM	ARSENIC	57 ppm	RPM	57 ppm	RPM
						COPPER	390 ppm	RPM	390 ppm	RPM
						HPAHs	960 ppm	RPM	960 ppm	RPM
						LEAD	450 ppm	RPM	450 ppm	RPM
						LPAHs	370 ppm	RPM	370 ppm	RPM
						MERCURY	0.41 ppm	RPM	0.41 ppm	RPM
						PCBs	12 ppm	RPM	12 ppm	RPM
						TBT	76 ppm	RPM	76 ppm	RPM
						ZINC	410 ppm	RPM	410 ppm	RPM
		10	East Waterway Sediments	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity	7/29/2003 EE/CA	DDT	0.0069 ppm	7/29/2003 EE/CA	0.0069 ppm	7/29/2003 EE/CA
						MERCURY	0.41 ppm	7/29/2003 EE/CA	0.41 ppm	7/29/2003 EE/CA
						PCBs	12 ppm	7/29/2003 EE/CA	12 ppm	7/29/2003 EE/CA
10	KETCHIKAN PULP COMPANY	2	Ward Cove	Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;	3/29/2000 ROD	4-METHYLPHENOL, AMMONIA				

Region	Site Name	OU	Area	Sediment RAOs	Sediment RAOs Reference	Sediment COCs	Sediment Action Level	Sediment Action Level Reference	Sediment Cleanup Level	Sed. Cleanup Level Reference
10	MCCORMICK & BAXTER CREOSOTING CO. (PORTLAND PLANT)	4	Williamette River	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment; Eliminate eco risk to aquatic organisms due to sediment/surface water toxicity; Minimizing releases of contaminants in sediment that may impact surface water quality	3/29/1996 ROD	ARSENIC	12 ppm	3/29/1996 ROD	12 ppm	3/29/1996 ROD
						DIOXINS (CHLORINATED DIBENZODIOXINS)	0.008 ppm	3/29/1996 ROD	0.008 ppm	3/29/1996 ROD
						PAHs	2 ppm	3/29/1996 ROD	2 ppm	3/29/1996 ROD
						PENTACHLOROPHENOL	100 ppm	3/29/1996 ROD	100 ppm	3/29/1996 ROD
10	OLD NAVY DUMP/MANCHESTER LABORATORY (USEPA/NOAA)	1	Intertidal Depression	Eliminate human health risk from dermal contact/incidental ingestion of surface water/sediment;Eliminate human health risk from ingestion of fish/shellfish;Reduce eco risk to aquatic organisms due to sediment/surface water toxicity;Reduce risk to wildlife due to fish/shellfish ingestion	9/30/1997 ROD	PCBs	0.13 ppm	9/30/1997 ROD	0.04 ppm	9/30/1997 ROD
10	PACIFIC SOUND RESOURCES	2	Marine Sediments	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/30/1999 ROD	PAHs	6100 ppm	9/30/1999 ROD		
						PCBs	12 ppm	9/30/1999 ROD		
10	PUGET SOUND NAVAL SHIPYARD COMPLEX	2	Marine and Near Shore Sinclair Inlet	Reduce human health risk from ingestion of fish/shellfish;	6/13/2000 ROD	PCBs	12 ppm Dredge, 6 ppm EMNR/cap	6/13/2000 ROD	3 ppm	6/13/2000 ROD
	WYCKOFF CO./EAGLE HARBOR	1	Subtidal and Intertidal Areas, East Harbor	Reduce human health risk from dermal contact/incidental ingestion of surface water/sediment; Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/29/1994 ROD	PAHs	1.2 ppm	9/2002 5-Year Review	1.2 ppm	9/2002 5-Year Review
		3	Mercury Hot Spots	Reduce human health risk from ingestion of fish/shellfish; Reduce eco risk to aquatic organisms due to sediment/surface water toxicity; Reduce risk to wildlife due to fish/shellfish ingestion	9/29/1992 ROD	MERCURY			0.59 ppm	Year 2 4th Quarter Data Report

Comments: Technical Memorandum on Risk Management Based Action Objectives

General Comments

The overarching goal of CERCLA and this Remedial Action Objective (RAO) process is to protect human health and the environment. The path to this endpoint is the performance of an RI/FS consistent with CERCLA, the NCP, and EPA guidance including following the principals in the *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*. The Technical Memorandum on Risk Management Based Action Objectives[1] (RMAOs) is a reasonable start to this end.

EPA expects the RMAOs to evolve during the RI/FS process. In particular, we expect to see these refined further as the Conceptual Site Model is developed and as the Assessment and Measurement Endpoints are selected during Problem Formulation. Additional logical times to refine RMAOs are following the Risk Assessment, the RI, and the FS.

Table 1 does not include an exhaustive list of pathways, although it does address many important ones. We do not see the need to expand the table at this time given that the CSM has not been prepared. Clearly however, this table in no way restricts the pathways to be developed in the CSM, and the pathways that will be investigated in the RI, nor does it restrict those evaluated in the ERA. Language to that effect needs to be added to the document or table.

Some of the pathways that will be discussed during Problem Formulation include:

- contaminant transfer from groundwater to pore water, sediment and surface water,
- organism exposure pathways involving direct dermal contact or ingestion with the different media,
- sediment and soil to surface water and groundwater; sediment pore water to surface water; pore water to benthic organisms,
- Organism exposure pathways involving direct dermal contact or ingestion with the different media,
- Aerial transport of contaminated soils,
- fish exposure via consumption of benthic organisms,
- Exposure pathways to amphibians and reptiles, zooplankton, and shellfish.

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[1] As stated in the Statement of Work for Remedial Investigation and Feasibility Studies Upper Columbia River Site, risk management based action objectives shall have the same meaning as remedial action objectives in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and their development shall be consistent with the NCP

We are confident these and other pathways will be considered in the development of the CSM which will also address trophic connections.

The term "population" is too broad. Population must be defined as a local group of individuals and not species-wide population. Table 1 seems to focus on populations, we expect that possible individual level analysis for some species, e.g. those that are candidate species, threatened or endangered under state, tribal, and federal laws and those species protect by treaty, and other ecosystem properties may be considered or included in the ERA (e.g., community metrics, dynamics, or ecosystem functions).

The contaminants of interest (COI) are still being defined based on Phase I data and anticipated data collection in the future. The COIs should not be limited to USEPA (2004). A more comprehensive characterization of the COIs is needed for the RI/FS.

Specific Comments

1. Page 1, 2nd paragraph, 2nd sentence lists contaminants of interest (COIs) identified in previous investigations conducted by state and federal agencies. The COIs listed include those identified in USEPA (2004) yet the statement is vague for "other metals and metalloids". The COIs are still being defined (e.g., fish tissue report). Other compounds that are potentially of interest are pesticides and PAHs. COIs should not be restricted to USEPA (2004). We suggest that the 3rd sentence be revised to emphasize that "the RI/FS process will ...further delineate the nature and extent of contaminants present at the Site, including a more comprehensive characterization of the COIs."

2. Page 1, 2nd paragraph, last sentence uses the term "support risk-based assessment of the potential exposure by ecological receptors to Site-related contaminants." This should be changed to read "and support an ecological risk assessment."

3. Page 1, par 3, sent 1: We suggest changing the wording to read: "Preliminary ecological RMAOs for the Site will be defined consistent with the NCP and EPA Guidance documents,..." since EPA guidance documents call for sound science among other guiding principles.

4. Page 2, last paragraph to Page 3, last sentence: As stated in previous comment, COI list is still being refined. We should not limit this list to what was defined in 2004 by USEPA.

5. Page 2, last par: For clarification, since the term RMAO is not in EPA guidance, the sentence should read: "EPA guidance (USEPA 1988) specifies that RAOs (here, termed RMAOs) ..."

6. Page 2, last par: We encourage Teck to consider the following definition of RAOs as compared with PRGs and Final Cleanup Levels:

RAOs, PRGs and Final Cleanup Levels

Remedial action objectives (RAOs) provide a general description of what the cleanup will accomplish (e.g., restoration of groundwater).

Preliminary remediation goals (PRGs) are the more specific statements of the desired endpoint concentrations or risk levels, for each exposure route, that are believed to provide adequate protection of human health and the environment based on preliminary site information. Initial PRGs are developed early in the RI/FS process and are based on ARARs and other readily available information, such as concentrations associated with 10^{-6} cancer risk or a hazard quotient equal to one for noncarcinogens calculated from EPA toxicity information. Initial PRGs may also be modified based on exposure, uncertainty, and technical feasibility factors. As data are gathered during the baseline risk assessment and RI/FS, PRGs are refined into final contaminant-specific cleanup levels.

Cleanup levels. Based on consideration of factors during the nine criteria analysis and using the PRG as a point of departure, the final cleanup level may reflect a different risk level within the acceptable risk range (10^{-4} to 10^{-6} for carcinogens) than the originally identified PRG. The final cleanup levels, not PRGs, are documented in the Record of Decision. (EPA 1997;

http://www.epa.gov/superfund/resources/rules/rulesthm.pdf)

7. Page 3, second complete paragraph, parenthesis in last sentence. Chemicals, receptors, and exposure media may be screened out or screened in as new data become available.

8. Table 1, 3rd block under Sediments: Please delete "non-nuisance" since this term is not yet defined. It can be discussed in the work plan and during Problem Formulation when Assessment and Measurement Endpoints are selected.

9. Table 1, 1st block under Surface Water: Rewrite in similar terms to the other RMAOs. Change to read: "Reduce to acceptable levels the risks to ..."